

**Quantitative Modeling to Link Climate  
Change Scenarios to Regional Hydrologic  
Processes and Invasive Species Impacts in  
the Bay–Delta System**

**#0055**

# Technical Panel Review

**Proposal Name:** Quantitative Modeling to Link Climate Change Scenarios to Regional Hydrologic Processes and Invasive Species Impacts in the Bay-Delta System

**Applicant Organization:** NASA Ames Research Center

**Principal Lead Investigator(s):**

Potter, Christopher

Klooster, Steven

**Amount Requested:** \$834,310

**TSP Panel Summary of Findings:**

This proposal is well thought-out and put together. However, the proposal does not present a convincing position that the project proponents will be able to produce a viable management tool for ecological assessment of invasive species. There is other work currently ongoing to examine basin-scale effect of climate change that CALFED could adapt much more economically. The improvements to the models that are proposed would certainly advance and narrow the questions, but it is the panel's opinion that the information would not be usable by CALFED managers. There is not enough detail in the proposal to understand where the money would be spent or to determine if it is reasonable. For example, the proposal says that NASA will cover salaries but some salaries are included, five tasks are budgeted and only four are described, etc.

The panel believes that this project is a lofty goal and a good first step. There may be opportunities for this level of work in a decade or so after the relationship of the flow regimes through the Bay-Delta are understood well enough, particularly in relating to salmon traverse and resident native species population dynamics.

**Relevance to PSP Topic Areas:**

Low

Technical Panel Review

***TSP Technical Rating:***  
**Sufficient**

***TSP Funding Recommendation:***  
**Do Not Fund**

***TSP Amount Recommended:*** \$0

***Conditions:***

# External Technical Review #1

**Proposal Title:** Quantitative Modeling to Link Climate Change Scenarios to Regional Hydrologic Processes and Invasive Species Impacts in the Bay-Delta System

**Proposal Number:** 0055

**Proposal Applicant:** NASA Ames Research Center

## Purpose

Comments	The goals are explicit and internally consistent. The issue of climate change and how it may impact the CALFED area, and potentially require changes in operations is timely. However, for the area of the proposal which falls within my area of expertise, Task 4, evaluating the combined implications of climate change and invasive species on environmental processes, the current control and eradication programs are too dynamic to reliably inform the study, so the research proposed is ahead of the data needed to populate the models. The State is currently developing an invasive species program that could alter any assumptions that are proposed by this research. A pilot watershed would be a more appropriate scale to see if management will be informed by the results before investing in a full scale project.
Rating	Sufficient

## Background

Comments	The summary of existing models that will be refined and used for developing scaled down model for CALFED area provide the background for the proposed work. The text is often confusing.
Rating	Sufficient

## Approach

Comments	The approach will refine existing models and is appropriate. The Tasks outlined in the proposal to do not separate out the administrative work, though the budget does. All research and administrative work are to be accomplished by the two researchers, although, since there is overhead, it seems more likely that unidentified administrative staff will perform those tasks. The products from the project will be of limited management value. When attempting to access the NASA-USDA internet-based data and image server to determine if useful products might result, the server was unavailable. The objectives in Task 4 would produce valuable information if met, however, there it is not clear how the models will answer the questions posed.
Rating	Inadequate

## Feasibility

Comments	There are too many variables to use the proposed models to answer the questions posed by this proposal. while the existing models and the refinements proposed would narrow the predictions, I do not think that managers would use them manage their respective concerns in the CALFED area.
Rating	Inadequate

## Budget

Comments	The proposal indicates that the PIs salary is already supported by NASA, yet the budget shows some salary. In addition, the proposal text indicates that the facility is well equipped to support these activities, there are equipment costs in the budget. \$834,310 seems like a large investment for this project. It is unclear what UC Davis will contribute for \$220,000. There is not enough information on who will do the work, and what it is.
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## External Technical Review #1

<b>Rating</b>	Inadequate
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### Relevance To CALFED

<b>Comments</b>	The proposal addresses several CALFED priorities, including invasive species and "trends". However, it seems a little as though the invasive species element is an add-on to the real goals of the project. The project proposal touches on all of the "other" priorities listed above. It is unlikely that the information will be useful to CALFED resource managers and policy makers.
<b>Rating</b>	Sufficient

### Qualifications

<b>Comments</b>	The team at NASA Ames and CSU Monterey Bay appears qualified. For the \$220,000 contract to UC Davis, the PI information is not included, and at least one of the individuals mentioned as a collaborator from USDA/UC is known to be overcommitted and often unable to meet contract deadlines.
<b>Rating</b>	Sufficient

### Overall Evaluation Summary Rating

<b>Comments</b>	This is compelling research proposal, but will not, in my opinion, result in a product useful to managers. It is quite costly, and seems as though all of the CALFED priorities were mentioned, but it is unclear how the researchers will provide a useful tool.
<b>Rating</b>	Inadequate

# External Technical Review #2

**Proposal Title:** Quantitative Modeling to Link Climate Change Scenarios to Regional Hydrologic Processes and Invasive Species Impacts in the Bay-Delta System

**Proposal Number:** 0055

**Proposal Applicant:** NASA Ames Research Center

## Purpose

Comments	The goals and objectives are clearly stated. The work is timely and important and quite ambitious. The methods are well-established - the application is novel.
Rating	Above Average

## Background

Comments	The conceptual model is clearly stated and explains the basis very well. References are more than adequate.
Rating	Above Average

## Approach

Comments	The approach is well-designed. Standard, well-established hydrological models will be used in novel ways. Responsibilities for the various tasks are clearly defined and resources are sufficient. The information dissemination plan is a good one; the specification of a web-based or downloadable application is appropriate and will enhance the utility of the authors' work.
Rating	Above Average

## Feasibility

Comments	The approach is fully-documented and feasible. It is ambitious, but the likelihood of success is quite high. The scale is consistent with all objectives, which are fully within the grasp of the authors.
Rating	Above Average

## Budget

Comments	The budget is appropriate and consistent with the objectives.
Rating	Above Average

## Relevance To CALFED

Comments	This work involves multiple disciplines and addresses CALFED research priorities. It also addresses CALFED synthesis and modeling objectives. By developing a web-based/downloadable decision-support tool the authors will ensure that their results will more likely be used by CALFED resource managers and other stakeholders.
Rating	Above Average

## Qualifications

Comments	The authors have the necessary qualifications to conduct a successful research project. Infrastructure and other support aspects are available.
Rating	Above Average

## Overall Evaluation Summary Rating

Comments	This a strongly multidisciplinary proposal. Its mating of climate-change scenarios to the regional hydrology is highly relevant; further coupling to invasive species adds much value. The team and facilities are
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External Technical Review #2

	very good.
Rating	Above Average

# External Technical Review #3

**Proposal Title:** Quantitative Modeling to Link Climate Change Scenarios to Regional Hydrologic Processes and Invasive Species Impacts in the Bay-Delta System

**Proposal Number:** 0055

**Proposal Applicant:** NASA Ames Research Center

## Purpose

Comments	<p>The goals, objectives, and hypotheses are somewhat unclear in terms of outlining the hierarchy of the linkages between climate change and land cover scenarios, regional hydrology, invasive species impacts and environmental processes. The title is "Quantitative modeling to link climate change scenarios to regional hydrologic processes and invasive species impacts...". The primary goal stated in the next line is "to assess implications of past and future changes in climate, land use and invasive species on the regional hydrology and environmental processes" which is logically, a slightly different plan. The bullets that follow suggest that climate change scenarios are first to be linked to regional hydrology, then climate-hydrology will be quantitatively linked to ecosystem processes, then project operations and ecosystem processes will be linked, then the combined effect of climate change and invasive weeds will be evaluated. The efficacy of this idea is difficult to evaluate given the lack of detail especially in the later stages of the proposal. Specific key processes, be they hydrologic, ecologic, or operational are not described in the proposal. Existing knowledge of quantitative, process-level understanding of the scientific objectives is not demonstrated or referenced. A full scale implementation is likely unjustified. Further research at a pilot or demonstration scale would permit greater appreciation for the potential of the suite of</p>
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### External Technical Review #3

	approaches proposed, and would likely generate novel information for the Bay-Delta system.
<b>Rating</b>	Inadequate

## Background

<b>Comments</b>	The conceptual models are crystal clear and well presented for Tasks 1 through 3, which deal mainly with climatic and regulation-driven impacts on regional hydrology in a modelling framework. Task 4 is conceptually oversimplified and presumes that mechanistic or process-based understanding of invasive species and predictive capability can be gleaned from large-scale model/model intercomparisons. No biophysical basis for prediction in this context is provided. Even regional hydrologic understanding is likely to be empirical rather than process-based at this scale.
<b>Rating</b>	Inadequate

## Approach

<b>Comments</b>	<p>As stated in the background comments, the approach is clear to a degree in that it ably provides a summary of the climate/hydrologic methods. It is less clear in terms of the approach to be used for interlinkage to invasive species impacts, apart from mapping their current extent, which apparently has not been previously included in the models. There is no doubt that an improved regional scale hydrologic model will emerge from this approach, but there is no information to suggest that any predictive capability will be possible for environmental processes or invasive species.</p> <p>comprehensive information is provided to establish that hydrologic changes accompanying invasive species impacts occur systematically enough to be modelled on a regional scale.</p>
<b>Rating</b>	

### External Technical Review #3

	Inadequate
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### Feasibility

Comments	Including reservoir effects and better land cover maps which depict invasive species etc. is a technically feasible modelling proposition. The notion that new understanding of environmental processes will emerge from this analysis is somewhat optimistic. Given the complexity of real processes, the full coupling of realistic climate change and invasive species scenarios will be difficult to achieve, while maintaining predictive capability.
Rating	Inadequate

### Budget

Comments	The budget is somewhat difficult to follow. Five tasks are budgeted for, yet only four tasks are described.
Rating	Inadequate

### Relevance To CALFED

Comments	The concept is highly relevant to the PSP but the objectives are somewhat unrealistic given the current status of existing work in the area, as described in the proposal. Further research at a pilot or demonstration scale would presumably be useful to CALFED, but rationale stops short of being convincing about modelling complex regional interactions between hydrological, ecological, and climatological factors.
Rating	Sufficient

### Qualifications

Comments	The team is well-respected and highly qualified to carry out this project.
Rating	

External Technical Review #3

	Above Average
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**Overall Evaluation Summary Rating**

<b>Comments</b>	The proposal fails to convince that the team will be able to focus on its primary objective of assessing the implications of past and future changes in climate, land use, and in particular, invasive species on the regional hydrology. Effort would likely be diverted to improving land cover and climate scenarios in existing regional hydrology models, rather than on ecosystem-based assessment.
<b>Rating</b>	Inadequate